CLAIMS

What is claimed is:

Claim 1. Water-soluble supramolecular self-assemblies of a polyelectrolyte comprising:

at least one polyelectrolyte compound selected from the group consisting of diblock copolymers including ionizable units, permanently charged units or mixtures of ionizable and permanently charged units, multiblock copolymers including ionizable units, permanently charged units or mixtures of ionizable and permanently charged units, and random copolymers with grafted hydrophilic and essentially non-ionic oligomers or polymers, said random copolymers including ionizable units, permanently charged units or mixtures of ionizable and permanently charged units;

wherein a polyelectrolyte segment forms a core of the assembly and chemically bears non-ionic hydrophobic repeating units.

Claim 2. The supramolecular self-assemblies of claim 1, wherein:

said diblock copolymers include at least two blocks,

one of which is hydrophilic and essentially uncharged and another of which contains at least one repeating unit selected from the group consisting of ionizable or permanently-charged repeating units in combination with essentially hydrophobic monomers.

Claim 3. The supramolecular self-assemblies of claim 2, wherein:

said ionizable units are repeating units that can be transformed from a non-ionic to a charged state via an external stimulus.

Claim 4. The supramolecular self-assemblies of claim 3 wherein:

said external stimulus is selected from the group consisting of a change in pH or conduction of a chemical reaction.

Claim 5. The supramolecular self-assemblies of claim 2, wherein:

said permanently charged units are repeating units that are electrostatically charged irrespective of external

conditions.

Claim 6. The supramolecular self-assemblies of claim 2, wherein:

said ionizable or permanently-charged block, bearing hydrophobic repeating units, is synthesized from at least one hydrophobic compound selected from the group consisting of vinyl monomers, vinyl oligomers, and vinyl polymers.

Claim 7. The supramolecular self-assemblies of claim 6, wherein;

said hydrophobic compound is at least one compound selected from the group consisting of acrylate, acrylamide, alkylacrylate, alkylacrylamide, arylacrylate and arylacrylamide derivatives.

Claim 8. The supramolecular self-assemblies of claim 7, wherein:

said alkyl or aryl derivatives include at least one aliphatic or aromatic moiety selected from the group consisting of acrylate, acrylamide, methacrylate and methacrylamide derivatives.

Claim 9. The supramolecular self-assemblies of claim 6, wherein:

said hydrophobic compound is at least one vinyl-terminated biodegradable polyester.

Claim 10. The supramolecular self-assemblies of claim 9, wherein:

said vinyl terminated biodegradable polyester is selected from the group consisting of vinyl-terminated poly(lactide) and vinyl-terminated poly(ε-caprolactone).

Claim 11. The supramolecular self-assemblies of claim 2, wherein:

said ionizable units include at least one compound selected from the group consisting of alkylacrylic acid derivatives, (aminoalkyl)acrylate derivatives, and (aminoalkyl)alkylacrylate derivatives.

Claim 12. The supramolecular self-assemblies of claim 2, wherein:

said hydrophilic block is synthesized from at least one

hydrophilic compound selected from vinyl monomers, vinyl oligomers and vinyl polymers.

Claim 13. The supramolecular self-assemblies of claim 12, wherein:

said hydrophilic compound is at least one compound selected from the group consisting of acrylate derivatives, acrylamide derivatives, alkylacrylate derivatives, alkylacrylamide, and N-vinyl-2-pyrrolidone derivatives.

Claim 14. The supramolecular self-assemblies of claim 2, wherein:

said hydrophilic block originates from a macroinitiator based on poly(ethylene glycol) or poly(N-vinyl-2-pyrrolidone).

Claim 15. A pharmaceutical formulation comprising supramolecular self-assemblies of claim 1 in combination with an effective amount of at least one pharmacological constituent.

Claim 16. The pharmaceutical formulation of claim 15,

wherein the pharmacological constituent is a drug.

Claim 17. The pharmaceutical formulation of claim 15, wherein the pharmacological constituent is a peptide, protein or genetic material.

Claim 18. The pharmaceutical formulation of claim 15, including a targeting ligand.

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